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them. It is to be doubted whether this field for the increase of happiness is as much as suspected by very many persons. One of the first conditions of the stability and harmony of society is the correct working of the double-headed system on which it has been created. It cannot be denied that the greater the amount of interest invested in this system, the more secure it must become. The stimulus which intelligent people bring to bear on each other is very great, and where this comes from a person in whom the affections are deeply interested, the force is greatly multiplied. It is self-evident that the effects of this force must be seen in the race, and that it is one powerful agent in progressive evolution. It acts especially in times of prosperity, when the pressure of the struggle for physical existence is diminished. It assumes especial importance when the impetus derived from the latter source diminishes, and is the best guarantee of future progress at such a time. Any agency, therefore, which effects the development of one sex, is a blessing to the other.

Is the present constitution of Christian society the best for the maintenance and development of the highest qualities of the mind? It is evident that the monogamic system will be preferred in proportion as the mental constitution of the sexes adapts them best to each other's needs. The rational education of women is not in the interest of polygamy; and the development of the higher affections of men is equally in the direction of monogamy. Monogamy in a community is doubtless in direct proportion to the development of its members in rational and sympathetic qualities. But sexual selection has but imperfect opportunities where there is little to choose from in the poorer classes; and where there are conventional standards of excellence in the richer classes. The problem is how to secure a just regard for the far-reaching law of sexual selection, consistently with a maintenance of the monogamic relation. General culture will do much towards placing the solution in the hands of every one, and toward producing any modification of existing customs which may be necessary.—*C.*

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RECENT LITERATURE.

VOLCANOES.[1]—The recent activity in the study of volcanism, with the erection on Mt. Vesuvius and Mt. Etna of observatories for the observation of volcanic phenomena, and of eruptive rocks by new methods of research, has called for a popular work treating of this subject in a simple and yet comprehensive way. These conditions have been met by the author, who is a friend and disciple of the late Mr. Poulett Scrope. The volume presents little matter subject to criticism except from those who may oppose some of the writer's views on metamorphism, a matter regarding which there is naturally much difference of opinion. After describing the nature of volcanic action, well illustrated by the eruption of Vesuvius in 1872 (Fig. 1), which, with that of 1858, was probably more carefully observed and photographed than any previous outburst, the work treats of the products of volcanic action, the distribution of the materials ejected from volcanic vents, with the various structures built up around them, as

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[1] *The International Scientific Series. Volcanoes: What they are and what they teach.* By JOHN W. JUDD, F.R.S. With 96 illustrations. New York. D. Appleton & Co. 12mo, pp. 381.

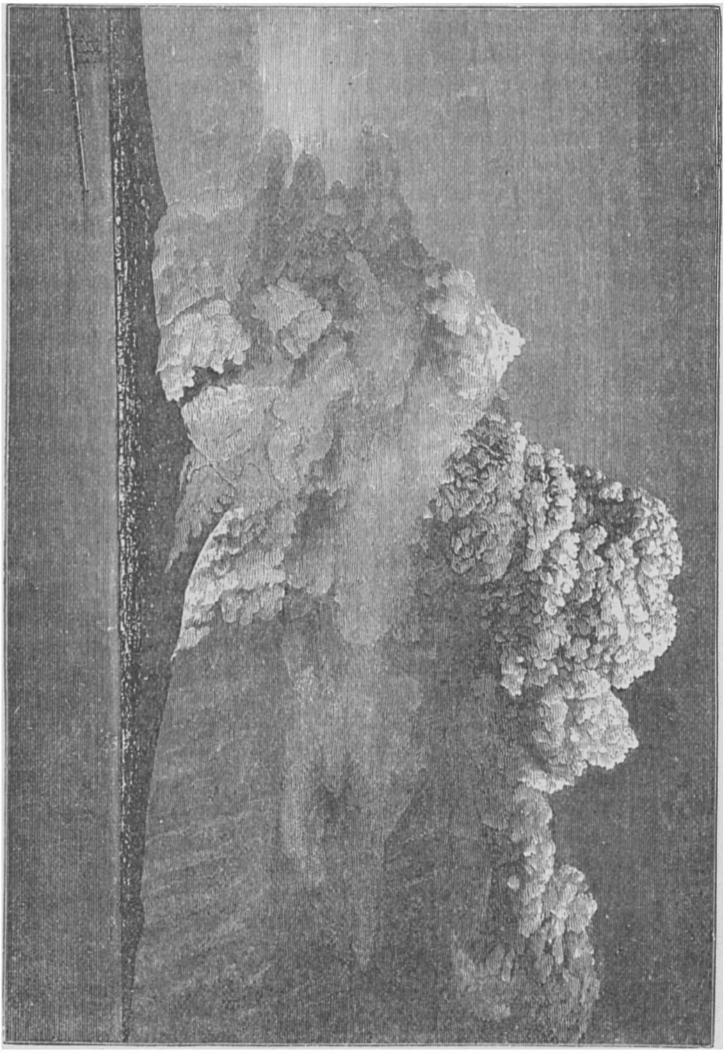

FIG. 1.—Vesuvius in eruption, as seen from Naples, April 26, 1872.

also the internal structure of volcanic mountains and their distribution over the earth.

The nature of lava overflows and the causes of the differences in their rate of motion are well discussed. The accompanying illustration (Fig. 2) of a lava stream which, from its imperfect fluidity in flowing over the edge of a precipice, forms heavy pendant masses like a "guttering" candle, is a fair example of the quality of the woodcuts.

The volcano from which all our pumice-stone comes is represented by Fig. 3. How this is formed is well told. By experiments with sawdust thrown up by an air-blast, the structure of volcanoes formed of scoriæ, pumice and other fragmental materials is illustrated.

"Many cones formed in the first instance of scoriæ, tuff and pumice may give rise to streams of lava, before the vent which they surround sinks into a state of quiescence. In these cases, the liquid lava in the vent gives off such quantities of steam that masses of froth, or scoriæ, are formed, which are ejected, and accumulate around the orifice. When the force of the explosive action is exhausted, the lava rises bodily in the crater, which it more or less completely fills. But eventually the weaker side of the crater wall yields beneath the pressure of the liquid mass, and this part of the crater and cone is swept away before the advancing lava stream. Examples of such 'breached cones' abound in Auvergne and many other volcanic districts. A beautiful example of a cone formed of pumice, which has been breached by the outflow of a lava stream of obsidian, occurs in

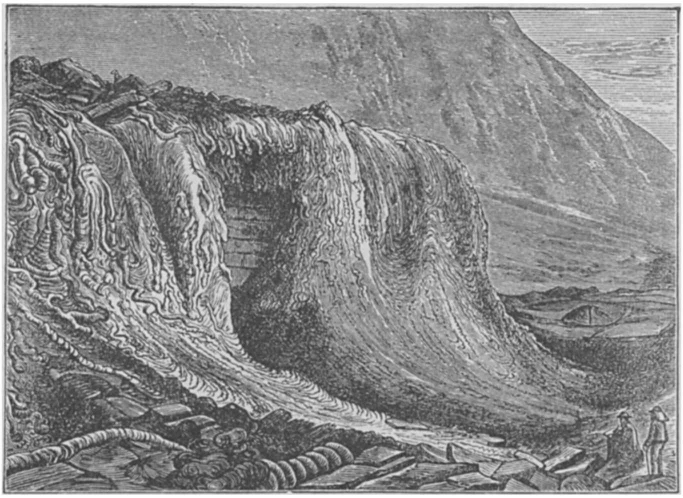

FIG. 2.—Cascade of lava tumbling over a cliff in the Island of Bourbon.

the Lipari islands, at the Rocche Rosse (Fig. 3). It is this locality which supplies the whole world with pumice."

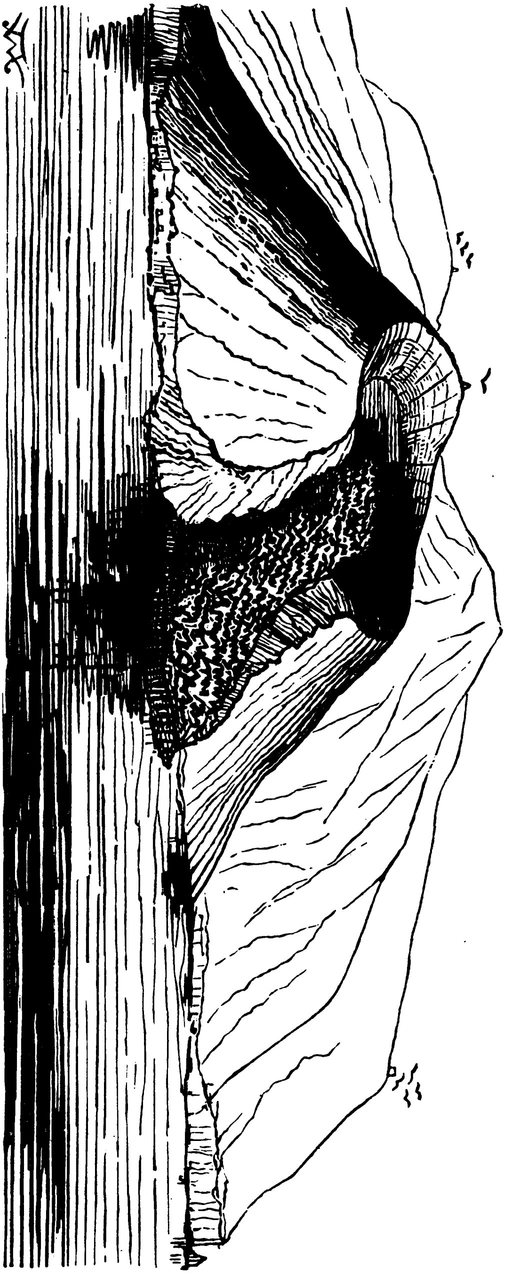

FIG. 3.—Campo Bianco, Island of Lipari. A pumice-cone breached by the overflow of an obsidian lava-current.

To the general student the closing third of the book will commend itself. The writer successfully applies the doctrine of continuity to volcanism and volcanic rocks. He claims that the granites formed in Tertiary times present no essential points of difference from those which originated in the earlier periods, and that the same materials may, under different conditions "assume either the characters of granite on the one hand, or of pumice on the other." Professor Judd assumes that "the careful consideration of all the facts of the case leads to the conclusion that when pumice, obsidian and rhyolite are now being ejected at the surface, the materials which form their substances are, at various depths in the earth's interior, slowly consolidating in the form of quartz-felsite, granite-porphyry and granite," and after farther discussion, he concludes "that the manifestations of the subterranean forces in the past agree precisely in their *nature* and in their *products* with those taking place around us at the present time." We are then led to the subject of the formation of mountain chains, which are happily termed "cicatrised mounds in the earth's solid crust." He then epitomises the leading events in the formation of mountain chains.

"A line of weakness first betrays itself at a certain part of the earth's surface by fissures, from which volcanic outbursts take place, and thus the position of the future mountain chain is determined. Next subsidence during many millions of years permits of the accumulation of the raw materials out of which the mountain range is to be formed; subsequent earth-movements cause these raw materials to be elaborated into the hardest and most crystalline rock-masses, and place them in elevated and favorable positions; and lastly, denudation sculptures from these hardened rock-masses all the varied mountain forms. Thus the work of mountain making is not, as was formerly supposed by geologists, the result of a simple upheaving force, but is the outcome of a long and complicated series of operations."

What volcanoes teach us concerning the nature of the earth's interior is given in a clear, interesting way. The "crust of the earth" is, as geology now shows, only that part of a solid globe accessible to examination, and the interior may consist of materials similar to those found in meteorites, while the volcanic phenomena witnessed on our earth may be identical in nature with the great movements in other worlds than ours."

BRUNTON'S BIBLE AND SCIENCE.[1]—The author of this excellent book makes a very successful attempt to reason with those who regard the doctrine of evolution "with horror mingled with fear." He gives a brief, popular and very readable sketch of some of the data on which the doctrine is founded, and shows "that instead of

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[1] *The Bible and Science.* By T. LAUDER BRUNTON, M.D., F.R.S., with illustrations. London, Macmillan & Co. 1881. 12mo, pp. 415. $2.50.